

## CLAIMS

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

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- 1 1. A method of depositing a film containing  
2 silicon on a crystalline silicon surface, said  
3 method including steps of  
4 introducing a gas containing precursor material  
5 into a reaction vessel,  
6 adsorbing an activated species formed from said  
7 precursor material on said crystalline silicon  
8 surface, and  
9 determining a partial pressure of hydrogen in  
10 residual gases as said activated species is  
11 deposited on said crystalline silicon surface.
- 1 2. A method as recited in claim 1, including the  
2 further step of  
3 controlling at least one of temperature and  
4 mass flow of said precursor material in said reactor  
5 vessel in response to said partial pressure of  
6 hydrogen.
- 1 3. A method as recited in claim 2 including the  
2 further steps of  
3 monitoring total residual gas pressure in said  
4 reactor vessel, and  
5 evaluating changes in said partial pressure of  
6 hydrogen based on said total pressure.

- 1 4. A method as recited in claim 1 wherein said  
2 film is epitaxial silicon.
- 1 5. A method as recited in claim 1 wherein said  
2 film is an alloy of silicon and germanium.
- 1 6. A method as recited in claim 1, including the  
2 further steps of  
3 repetitively sampling said residual gases, and  
4 converting said partial pressure of hydrogen  
5 corresponding to respective samples to a property of  
6 said film.
- 1 7. A method as recited in claim 6, wherein said  
2 property of said film is a film thickness.
- 1 8. A method as recited in claim 6, wherein said  
2 property of said film is a concentration of a  
3 material.
- 1 9. A method as recited in claim 6, wherein said  
2 film is an alloy of silicon and germanium and said  
3 property is a germanium concentration profile.
- 1 10. A method as recited in claim 1, wherein said  
2 film includes a film of silicon and a film of an  
3 alloy of silicon and germanium.

1 11. Apparatus for depositing a film containing  
 2 silicon on a crystalline silicon surface including  
 3 means for introducing a gas containing  
 4 precursor material into a reaction vessel such that  
 5 an activated species formed from said precursor  
 6 material is adsorbed on said crystalline silicon  
 7 surface, and  
 8 means for determining a partial pressure of  
 9 hydrogen in residual gases as said activated species  
 10 is deposited on said crystalline silicon surface.

1 12. Apparatus as recited in claim 11, further  
 2 including  
 3 means for controlling at least one of  
 4 temperature and mass flow of said precursor material  
 5 in said reactor vessel in response to said partial  
 6 pressure of hydrogen.

1 13. Apparatus as recited in claim 12, further  
 2 including  
 3 means for monitoring total residual gas  
 4 pressure in said reactor vessel, and  
 5 means for evaluating changes in said partial  
 6 pressure of hydrogen based on said total pressure.

1 14. Apparatus as recited in claim 11 wherein said  
 2 film is epitaxial silicon.

1 15. Apparatus as recited in claim 11 wherein said  
 2 film is an alloy of silicon and germanium.

1 16. Apparatus as recited in claim 11 further  
2 including  
3 means for repetitively sampling said residual  
4 gases, and  
5 means for converting said partial pressure of  
6 hydrogen corresponding to respective samples to a  
7 property of said film.

1 17. Apparatus as recited in claim 16, wherein said  
2 property of said film is a film thickness.

1 18. Apparatus as recited in claim 16, wherein said  
2 property of said film is a concentration of a  
3 material.

1 19. Apparatus as recited in claim 16, wherein said  
2 film is an alloy of silicon and germanium and said  
3 property is a germanium concentration profile.

1 20. Apparatus as recited in claim 11, wherein said  
2 film includes a film of silicon and a film of an  
3 alloy of silicon and germanium.